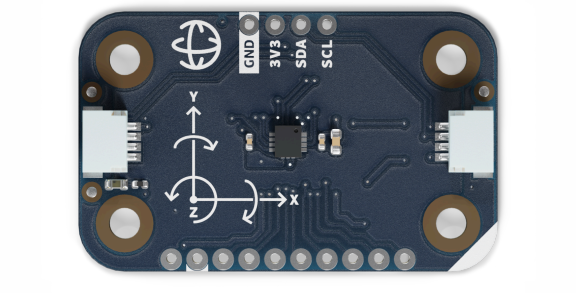
User Manual
SKU: ABX00101



Description

The Modulino® Movement, featuring the LSM6DSOXTR sensor, measures acceleration and rotation providing comprehensive data for motion detection applications. It's ideal for projects involving gesture recognition, pedometers, and vibration monitoring.

Target Areas

Maker, beginner, education

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1 Application Examples

Below are some project ideas focused on the Modulino® Movement module and its built-in LSM6DSOXTR sensor:

- **Gesture Recognition:** Harness the 6-axis motion data (accelerometer + gyroscope) to detect custom gestures. You can create interactive controls for games, user interfaces, or home automation—triggering actions when certain patterns (e.g., wrist flicks or device shakes) are recognized.
- **Step Counter or Pedometer:** Use the accelerometer data to count steps accurately in wearable or fitness-related projects. Log daily movements or design health-oriented applications that notify users of their activity progress.
- **Vibration Monitoring:** Monitor vibrations in appliances, machinery, or vehicles using the sensor's high-sensitivity accelerometer. Detect anomalies, implement predictive maintenance strategies, or create alert systems for sudden impact or shock events.
- **Orientation and Tilt Control:** Measure real-time orientation in space. Ideal for creating tilt-based controls in interactive art installations, DIY game controllers, or robotics projects that respond to angular displacement.
- **IMU-based Stabilization:** Leverage both gyroscope and accelerometer data for advanced applications like robotics or drones, where real-time inertial measurements are used to maintain stability and smooth motion control.

2 Features

- Incorporates the LSM6DSOXTR sensor to measure acceleration and rotation.
- Communicates via I2C (Qwiic connector) or SPI (optional).
- Powered by 3.3 V from the Qwiic/I2C bus; supports 1.71 V–3.6 V sensor supply range.
- Designed with an additional 1×10 header for advanced signals and a cuttable jumper to isolate VDDIO if needed.
- Ideal for motion-detection and wearable applications (gesture recognition, pedometers, vibration monitoring).

2.1 Contents

SKU	Name	Purpose	Quantity
ABX00101	Modulino® Movement	Measure acceleration and rotation	1
	I2C Qwiic cable	Compatible with the Qwiic standard	1

3 Related Products

- *SKU: ASX00027* - Arduino® Sensor Kit
- *SKU: K000007* - Arduino® Starter Kit
- *SKU: AKX00026* - Arduino® Oplà IoT Kit

4 Rating

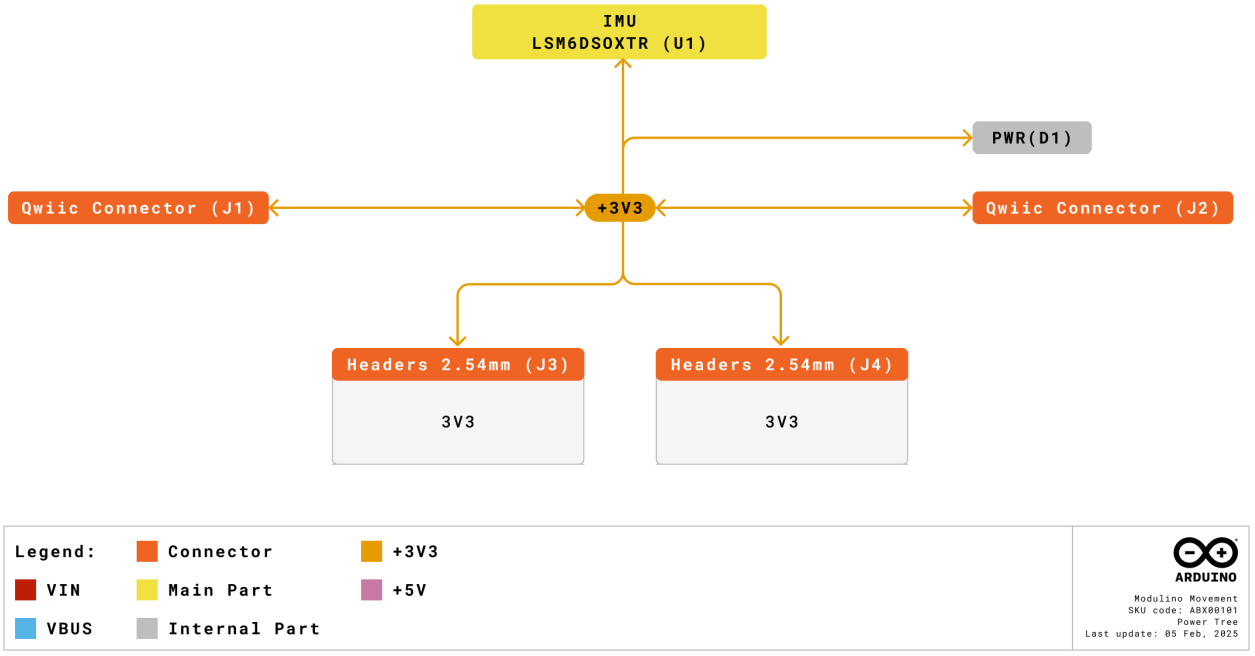
4.1 Recommended Operating Conditions

-Sensor supply range: 1.71 V – 3.6 V -Powered at 3.3 V through the Qwiic interface (in accordance with the Qwiic standard) -Operating temperature: –40 °C to +85 °C

Typical current consumption: Accelerometer: ~170 µA Gyroscope: ~0.55 mA

5 Power Tree

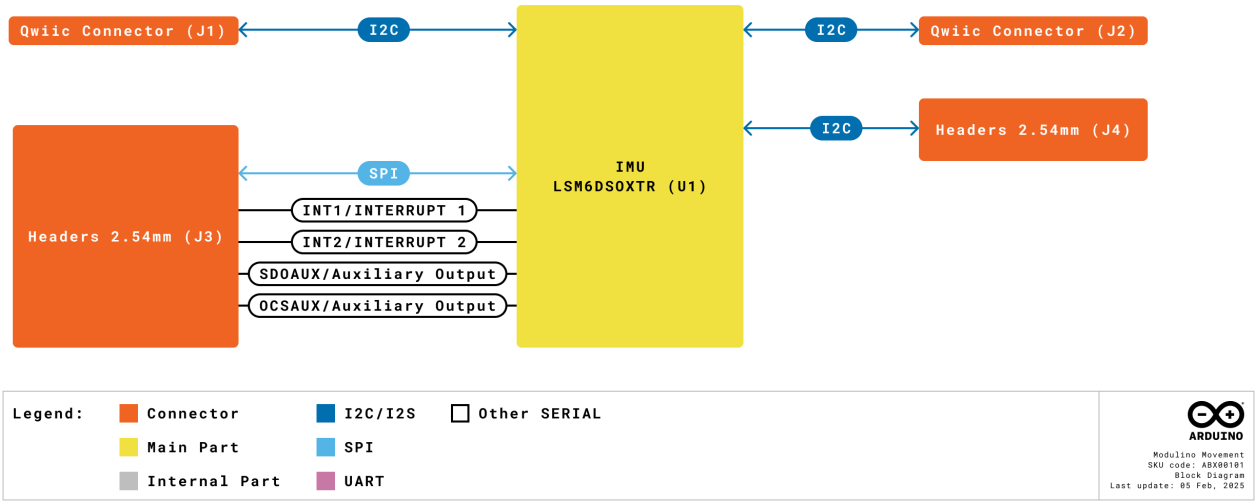
The power tree for the Modulino® node can be consulted below:



Modulino® Movement Power Tree

6 Block Diagram

This module is designed to be placed on an I2C bus, allowing the on-board LSM6DSOXTR sensor to communicate with a host microcontroller via I2C or, optionally, SPI.



Modulino® Movement block diagram

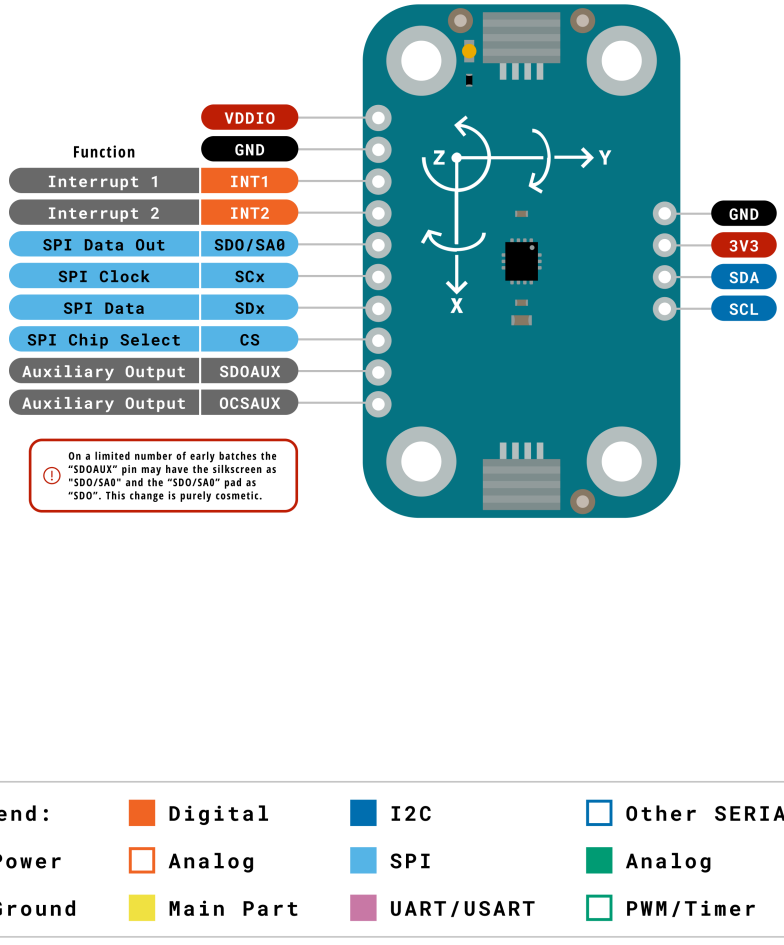
7 Functional Overview

The Modulino® Movement node uses the LSM6DSOXTR sensor for 3-axis acceleration and 3-axis gyroscopic measurements. It can detect motion, orientation. Data is accessed through I2C (via the Qwiic connector at 3.3 V) or SPI (through the additional header).

7.1 Technical Specifications

Specification	Details
Sensor	LSM6DSOXTR
Supply Voltage	Min: 1.71 V, Max: 3.6 V
Power Consumption	Accel: 170 µA, Gyro: 0.55 mA
Range (Gyro)	±125 dps to ±2000 dps
Accuracy	Accel: ±20 mg, Gyro: ±1 dps
Resolution	Accel: 0.061 mg/LSB to 0.488 mg/LSB; Gyro: 4.375 mdps/LSB to 70 mdps/LSB
Communication	SPI, I2C, MIPI I3CSM

7.2 Pinout



Pinout Overview

Qwiic / I2C (1×4 Header)

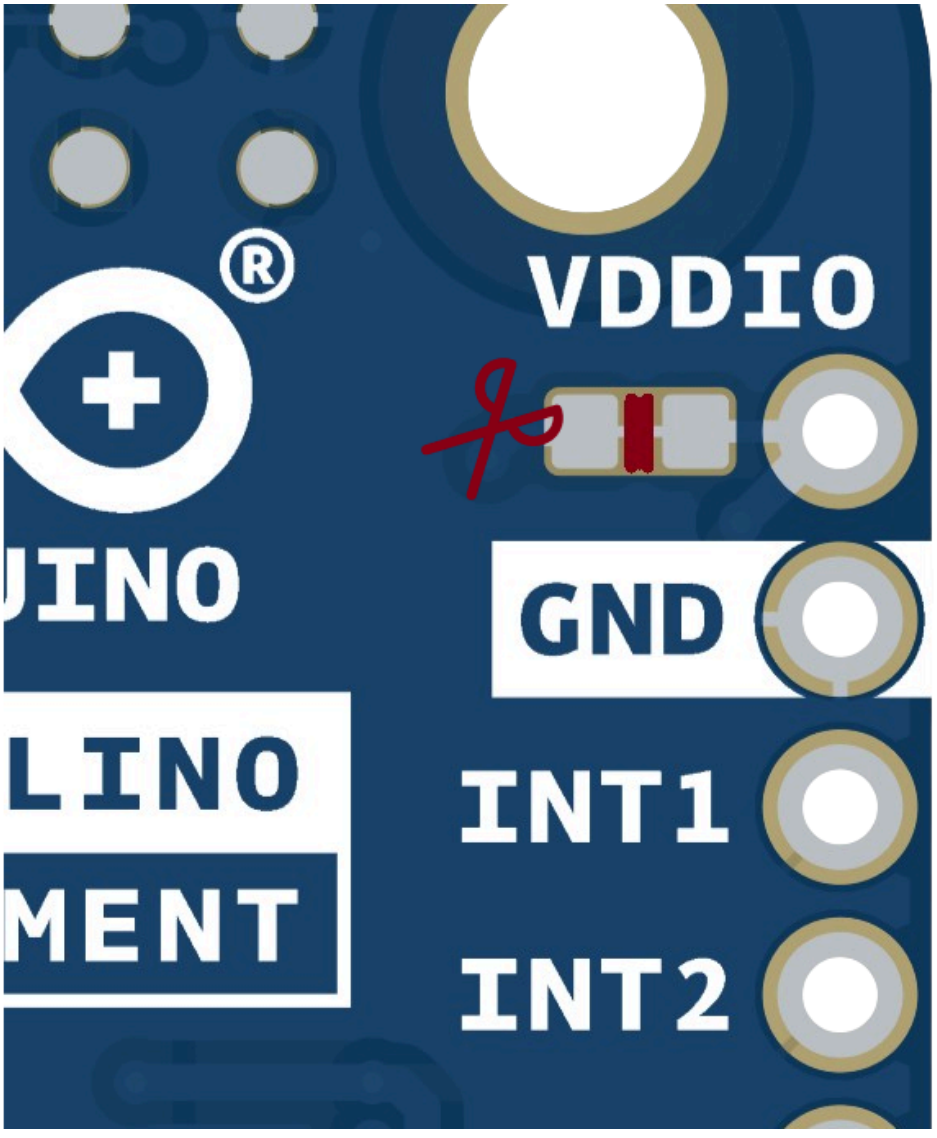
Pin	Function
GND	Ground
3.3 V	Power Supply (3.3 V)
SDA	I2C Data
SCL	I2C Clock

These pads and the Qwiic connectors share the same I2C bus. You can optionally solder header pins here.

Additional 1×10 Header (LSM6DSOXTR Signals)

Pin	Function
VDDIO	Power
GND	Ground
INT1	Interrupt 1
INT2	Interrupt 2
SDO/SA0	SPI Data Out
SCx	SPI Clock
SDx	SPI Data
CS	SPI Chip Select
SDOAUX	Auxiliary Output
OCSAUX	Auxiliary Output

Note: By cutting its solder jumper, you can isolate **VDDIO** from 3.3 V if needed.

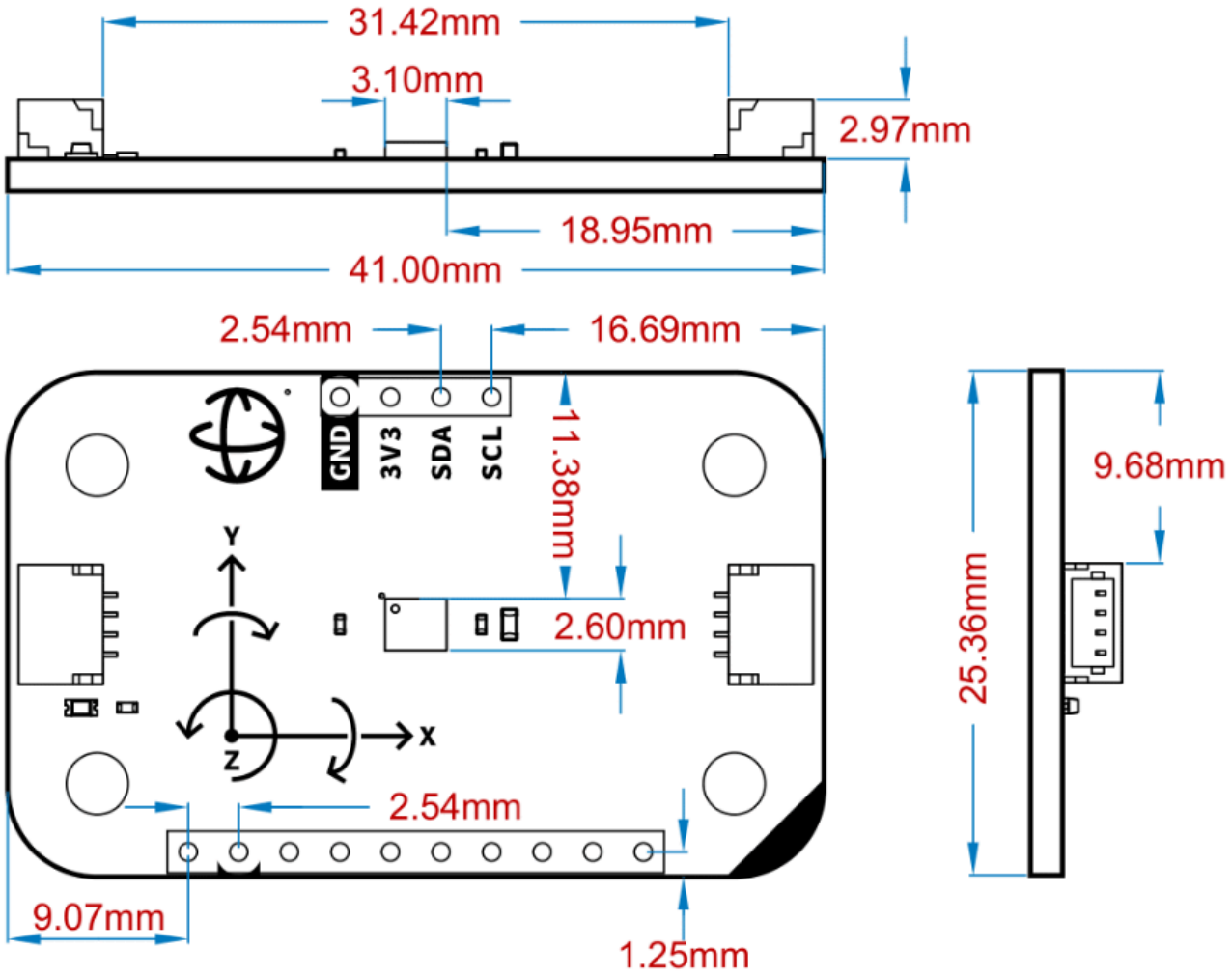


Optional jumper

7.3 Power Specifications

- **Nominal operating voltage:** 3.3 V via Qwiic
- **Sensor voltage range:** 1.71 V–3.6 V

7.4 Mechanical Information



Modulino® Movement Mechanical Information

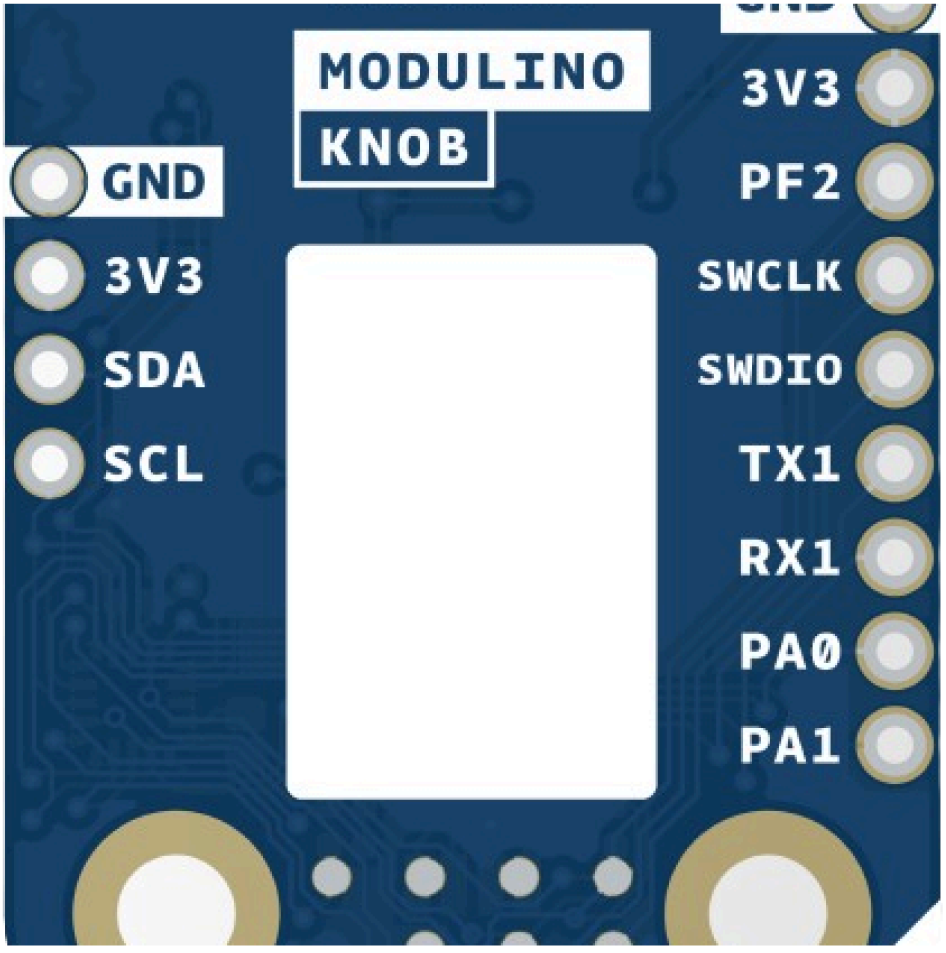
- Board dimensions: 41 mm × 25.36 mm
- Thickness: 1.6 mm (±0.2 mm)
- Four mounting holes (Ø 3.2 mm)
  - Hole spacing: 16 mm vertically, 32 mm horizontally

7.5 I2C Address Reference

Board Silk Name	Sensor	Modulino® I2C Address (HEX)	Editable Addresses (HEX)	Hardware I2C Address (HEX)
MODULINO MOVEMENT	LSM6DSOXTR	0x6A	0x6A, 0x6B (via solder jumper)	0x6A & 0x7E

Note:

- By default, you use **0x6A** in your code.
- The "Hardware I2C Address" might appear when scanning the bus.
- You can flip the address to **0x6B** by bridging or cutting the relevant solder jumper.
- A white rectangle on the bottom silk allows you to note a custom address.



Blank silk for identification

8 Device Operation

The Modulino® Movement node acts as an I2C target device on the Qwiic bus. Simply connect it via a Qwiic cable to the 3.3 V I2C interface of your microcontroller. If desired, SPI signals can be used instead via the additional header.

8.1 Getting Started

Use any standard Arduino workflow—desktop IDE or Arduino Cloud Editor. Libraries are available to simplify reading the LSM6DSOXTR sensor outputs (acceleration, gyroscope). Ensure your controller and this node share the same 3.3 V reference when using the Qwiic connection.

Certifications

9 Certifications Summary

Certification	Status
CE/RED (Europe)	Yes
UKCA (UK)	Yes
FCC (USA)	Yes
IC (Canada)	Yes
RoHS	Yes
REACH	Yes
WEEE	Yes

10 Declaration of Conformity CE DoC (EU)

We declare under our sole responsibility that the products above are in conformity with the essential requirements of the following EU Directives and therefore qualify for free movement within markets comprising the European Union (EU) and European Economic Area (EEA).

11 Declaration of Conformity to EU RoHS & REACH 211 01/19/2021

Arduino boards are in compliance with RoHS 2 Directive 2011/65/EU of the European Parliament and RoHS 3 Directive 2015/863/EU of the Council of 4 June 2015 on the restriction of the use of certain hazardous substances in electrical and electronic equipment.

Substance	Maximum limit (ppm)
Lead (Pb)	1000
Cadmium (Cd)	100
Mercury (Hg)	1000
Hexavalent Chromium (Cr6+)	1000
Poly Brominated Biphenyls (PBB)	1000
Poly Brominated Diphenyl ethers (PBDE)	1000
Bis(2-Ethylhexyl) phthalate (DEHP)	1000
Benzyl butyl phthalate (BBP)	1000
Dibutyl phthalate (DBP)	1000
Diisobutyl phthalate (DIBP)	1000

Exemptions: No exemptions are claimed.

Arduino Boards are fully compliant with the related requirements of European Union Regulation (EC) 1907 /2006 concerning the Registration, Evaluation, Authorization and Restriction of Chemicals (REACH). We declare none of the SVHCs (https://echa.europa.eu/web/guest/candidate-list-table), the Candidate List of Substances of Very High Concern for authorization currently released by ECHA, is present in all products (and also package) in quantities totaling in a concentration equal or above 0.1%. To the best of our knowledge, we also declare that our products do not contain any of the substances listed on the "Authorization List" (Annex XIV of the REACH regulations) and Substances of Very High Concern (SVHC) in any significant amounts as specified by the Annex XVII of Candidate list published by ECHA (European Chemical Agency) 1907 /2006/EC.

12 Conflict Minerals Declaration

As a global supplier of electronic and electrical components, Arduino is aware of our obligations with regard to laws and regulations regarding Conflict Minerals, specifically the Dodd-Frank Wall Street Reform and Consumer Protection Act, Section 1502. Arduino does not directly source or process conflict minerals such as Tin, Tantalum, Tungsten, or Gold. Conflict minerals are contained in our products in the form of solder or as a component in metal alloys. As part of our reasonable due diligence, Arduino has contacted component suppliers within our supply chain to verify their continued compliance with the regulations. Based on the information received thus far we declare that our products contain Conflict Minerals sourced from conflict-free areas.

13 FCC Caution

Any Changes or modifications not expressly approved by the party responsible for compliance could void the user's authority to operate the equipment.

This device complies with part 15 of the FCC Rules. Operation is subject to the following two conditions:

1. This device may not cause harmful interference.
2. This device must accept any interference received, including interference that may cause undesired operation.

FCC RF Radiation Exposure Statement:

1. This Transmitter must not be co-located or operating in conjunction with any other antenna or transmitter.
2. This equipment complies with RF radiation exposure limits set forth for an uncontrolled environment.
3. This equipment should be installed and operated with a minimum distance of 20 cm between the radiator & your body.

Note: This equipment has been tested and found to comply with the limits for a Class B digital device, pursuant to part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation. This equipment generates, uses and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures:

- Reorient or relocate the receiving antenna.
- Increase the separation between the equipment and receiver.
- Connect the equipment into an outlet on a circuit different from that to which the receiver is connected.
- Consult the dealer or an experienced radio/TV technician for help.

English: User manuals for license-exempt radio apparatus shall contain the following or equivalent notice in a conspicuous location in the user manual or alternatively on the device or both. This device complies with Industry Canada license-exempt RSS standard(s). Operation is subject to the following two conditions:

1. this device may not cause interference.

2. this device must accept any interference, including interference that may cause undesired operation of the device.

French: Le présent appareil est conforme aux CNR d'Industrie Canada applicables aux appareils radio exempts de licence. L'exploitation est autorisée aux deux conditions suivantes:

1. l'appareil nedoit pas produire de brouillage.
2. l'utilisateur de l'appareil doit accepter tout brouillage radioélectrique subi, même si le brouillage est susceptible d'en compromettre le fonctionnement.

IC SAR Warning:

English: This equipment should be installed and operated with a minimum distance of 20 cm between the radiator and your body.

French: Lors de l'installation et de l'exploitation de ce dispositif, la distance entre le radiateur et le corps est d'au moins 20 cm.

Important: The operating temperature of the EUT can't exceed 85 °C and shouldn't be lower than -40 °C.

Hereby, Arduino S.r.l. declares that this product is in compliance with essential requirements and other relevant provisions of Directive 2014/53/EU. This product is allowed to be used in all EU member states.

Company Information

Company name	Arduino SRL
Company Address	Via Andrea Appiani, 25 - 20900 MONZA（Italy)

Reference Documentation

Ref	Link
Arduino IDE (Desktop)	https://www.arduino.cc/en/Main/Software
Arduino Courses	https://www.arduino.cc/education/courses
Arduino Documentation	https://docs.arduino.cc/
Arduino IDE (Cloud)	https://create.arduino.cc/editor
Cloud IDE Getting Started	https://docs.arduino.cc/cloud/web-editor/tutorials/getting-started/getting-started-web-editor
Project Hub	https://projecthub.arduino.cc/
Library Reference	https://github.com/arduino-libraries/
Online Store	https://store.arduino.cc/

Revision History

Date	Revision	Changes
17/06/2025	3	Nomenclature updates
23/05/2025	2	Fixed pinout table and power info
14/05/2025	1	First release